

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicants : Takanori SUGIYAMA et al.

Group Art Unit: 2874

Appln. No. : 10/596,393

Examiner: S. U. SONG

Filed : June 12, 2006

Confirmation No. : 6011

For : OPTICAL SWITCH

**AMENDMENT UNDER 37 C.F.R. 1.111**

Commissioner for Patents  
U.S. Patent and Trademark Office  
Customer Service Window, Mail Stop AMENDMENT  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314

Sir:

In response to the Official Action of April 3, 2007, in which a three-month shortened statutory period for response was set to expire on July 3, 2007, Applicants respectfully request reconsideration and withdrawal of the rejections set forth in the above-mentioned Official Action.

**A Complete Listing of Claims** *begins on page 2 of this paper.*

Applicants' **Remarks** *begin on page 14 of this paper.*

**IN THE CLAIMS**

**The following claim listing replaces all prior listings and versions of the claims:**

**COMPLETE LISTING OF CLAIMS:**

1. (Currently Amended) An optical switch for switching combinations of optical paths between a plurality of optical fibers, comprising:

a device body with at least three optical fibers being led out therefrom; and

a switching optical block housed in the device body so as to be optically coupled to the respective optical fibers,

the optical block comprising:

a an integrally formed lens block having one surface side to place the optical fibers on, and ~~having comprising~~ a plurality of collimating lenses placed side by side in the device body;

a prism which is placed distantly from the lens block on the other surface side of the lens block such that the direction of travel of light incident from the optical fibers through the collimating lens is changed to be directed toward a further optical fiber;

a switching mirror placed to be insertable and removable into and from between the lens block and the prism; and

an actuator for driving the mirror,

wherein the respective optical fibers are led out from the one surface side of the device body, and

the lens block has the plurality of integrally formed collimating lenses.

2. (Cancelled)

3. (Previously presented) The optical switch according to claim 1, wherein the lens block has fixed thereto ferrules holding the respective optical fibers, respectively.

4. (Original) The optical switch according to claim 3, wherein the bonding surfaces between the lens block and the ferrules are formed by planes inclined at an angle to at least some extent relative to planes perpendicular to axes of passing light beam.

5. (Original) The optical switch according to claim 4, wherein the optical block comprises one optical bench contained in and mounted on the device body for positioning and fixing the lens block, the prism and the actuator.

6. (Original) The optical switch according to claim 3, wherein the optical block comprises one optical bench contained in and mounted on the device body for positioning and fixing the lens block, the prism and the actuator.

7. (Currently amended) The optical switch according to claim 1, wherein the bonding surfaces between the lens block and the ferrules are formed by planes inclined at an angle to at least some extent relative to planes perpendicular to axes of passing light beams beam.

8. (Original) The optical switch according to claim 7, wherein the optical block comprises one optical bench contained in and mounted on the device body for positioning and fixing the lens block, the prism and the actuator.

9. (Previously presented) The optical switch according to claim 1, wherein the optical block comprises one optical bench contained in and mounted on the device body for positioning and fixing the lens block, the prism and the actuator.

10. (Currently amended) The optical switch according to claim [[1]] 8, wherein the lens block has fixed thereto ferrules holding the respective optical fibers, respectively.

11. (Original) The optical switch according to claim 10, wherein the bonding surfaces between the lens block and the ferrules are formed by planes inclined at an angle to at least some extent relative to planes perpendicular to axes of passing light beam.

12. (Original) The optical switch according to claim 11, wherein the optical block comprises one optical bench contained in and mounted on the device body for positioning and fixing the lens block, the prism and the actuator.

13. (Original) The optical switch according to claim 10, wherein the optical block comprises one optical bench contained in and mounted on the device body for positioning and fixing the lens block, the prism and the actuator.

14. (Original) The optical switch according to claim 1, wherein the bonding surfaces between the lens block and the ferrules are formed by planes inclined at an angle to at least some extent relative to planes perpendicular to axes of passing light beam.

15. (Original) The optical switch according to claim 14, wherein the optical block comprises one optical bench contained in and mounted on the device body for positioning and fixing the lens block, the prism and the actuator.

16. (Original) The optical switch according to claim 1, wherein the optical block comprises one optical bench contained in and mounted on the device body for positioning and fixing the lens block, the prism and the actuator.

**REMARKS**

Upon entry of the present Amendment, claims 1 and 3-16 will be pending, of which claims 1, 7 and 10 and will have been amended. In particular, claim 1 will have been amended to clarify that the lens block is integrally formed; claim 7 will have been amended to improve the grammar, idiom and syntax used in the claim so as to clarify the features of Applicants' invention without narrowing the scope of the claim; and claim 10 will have been amended to afford Applicants a scope of protection to which they are entitled.

In view of the herein contained remarks, Applicants respectfully request reconsideration and withdrawal of the rejection together with an indication of the allowability of all the claims pending in the present application, in due course. Such action is respectfully requested and is believed to be appropriate and proper.

Initially, Applicants note with appreciation the Examiner's consideration of the documents cited in the Information Disclosure Statement, filed on September 14, 2006, in the present application. Applicants thank the Examiner for returning, with the afore-noted Official Action, an initialed and signed copy of the Form PTO-1449 that accompanied the September 14, 2006 Information Disclosure Statement.

Applicants note that a Supplemental Information Disclosure Statement (SIDS) was filed, along with a Form PTO-1449, on March 29, 2007, and a Completion of Record was filed on April 17, 2007, along with a copy of a Japanese Office Action, dated February 2, 2007, and an English language translation of the same, with respect to patent family member Japanese Patent Application No. 2004-283813. Applicants respectfully request that the Examiner acknowledge consideration of the documents cited in the SIDS filed March 29, 2007 and the Completion of

Record filed on April 17, 2007 by returning a signed and initialed copy of the Form PTO-1449 that accompanied the SIDS of March 29, 2007 in the next Official communication.

Applicants also note with appreciation the Examiner's acknowledgement of Applicants' claim for foreign priority under 35 U.S.C. § 119(a)-(d), as well as confirmation of receipt of the certified copy of the priority document, and the Examiner's acceptance of the drawings filed on June 12, 2006.

In the above noted Official Action, mailed April 3, 2007, claims 1 and 3-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over CHEN et al. (U.S. Patent No. 6,647,173) in view of MAKIO (U.S. Patent Application Publication No. US 2003/0053744) cited by Applicants. Applicants respectfully traverse the rejection and request reconsideration and withdrawal of the same, and an indication of the allowability of claims 1 and 3-16 in the next Official communication, for at least the reasons provided herein. Applicants submit that the CHEN et al. and/or MAKIO do not teach or suggest Applicants invention as recited in, for example, independent claim 1.

The present invention is directed to an optical switch for switching combinations of optical paths between a plurality of optical fibers. The optical switch comprises, *inter alia*, an integrally formed lens block comprising a plurality of integrally formed collimating lenses. The lens block of the present invention is formed integrally and indivisibly as a single mold with the plurality of collimating lenses, as shown, for example, in Figures 2, 4(a) and 4(b) of the present application. By using the integrally formed lens block of the present invention, it is possible to improve optical characteristics, and to reduce the number of components as compared to systems that include a plurality of discretely formed collimating lenses, thereby enabling cost reduction. Applicants submit that CHEN et al. and/or MAKIO, whether taken alone or in any proper

combination, do not teach or suggest an integrally formed lens block comprising a plurality of collimating lenses which are formed into a single mold with the lens block.

CHEN et al. teaches an optical switch with a moveable optical component as shown in, for example, Figure 1, that uses two discrete lenses. Referring to Figure 1, the optical switch 99 uses two discrete lenses 17 and 18 (as shown, e.g., in Figures 3 and 4) which are combined by using an upright beam 32. The upright beam 32, however, is not a lens block, much less an integrally formed lens block that comprises a plurality of collimating lenses.

Further, at page 3 of the Official Action, the rejection acknowledges that CHEN et al. does not expressly disclose a device body with at least three optical fibers being led out therefrom and therefore relies on MAKIO to teach that which CHEN et al. lacks. Applicants add that not only does CHEN et al. not expressly disclose the device body so configured, but also does not implicitly disclose or suggest such an element. Applicants submit that MAKIO does not teach that which CHEN et al. lacks, namely, an integrally formed lens block comprising a plurality of integrally formed collimating lenses.

MAKIO is directed to an optical switch comprising one input optical fiber, two output optical fibers, a stationary mirror for reflecting a light beam from the input optical fiber to cause it to enter into one output optical fiber, a movable mirror moving into and out of an optical path of a light beam from the input optical fiber, and a mechanism for driving the movable mirror. However, MAKIO does not teach or suggest an integrally formed lens block comprising a plurality of integrally formed collimating lenses such that the collimating lenses are formed into a single mold lens block.

Accordingly, any proper combination of CHEN et al. and/or MAKIO would not teach or suggest an integrally formed lens block comprising a plurality of integrally formed collimating



lenses, as recited in, e.g., independent claim 1. Thus, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1 and 3-16 under 35 U.S.C. 103(a) as being obvious over CHEN et al. and MAKIO.

Since claims 2 and 3-16 depend from claim 1 and are patentably distinguishable for at least the reasons provided above with respect to claim 1, as well as for additional reasons related to their own recitations, Applicants respectfully request the reconsideration and withdrawal of the rejection of claims 3-16 under 35 U.S.C. 103 based on CHEN et al. and MAKIO, and an indication of the allowability of claims 1 and 3-16 in the next Official communication. Thus, Applicants respectfully request allowance of this application to mature into U.S. patent, including claims 1 and 3-16.

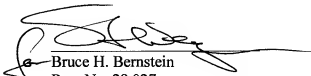
**SUMMARY AND CONCLUSION**

In view of the foregoing, it is submitted that rejections under 35 USC 103 in the Official Action dated April 3, 2007, should be withdrawn. The present Amendment is in proper form, and none of the references teach or suggest Applicants' claimed invention. In addition, the applied references of record have been discussed and distinguished, while significant features of the present invention have been pointed out. Accordingly, Applicants request timely allowance of the present application.

Should an extension of time be necessary to maintain the pendency of this application, the Commissioner is hereby authorized to charge any additional fee to Deposit Account No. 19-0089.

Should there be any questions regarding this paper or the present application, the Examiner is respectfully requested to contact the undersigned at the below-listed telephone number.

Respectfully submitted,  
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